

# ABSTRACT

A method for deriving barycentric coordinates for a point  $\mathbf{p}$  within an  $n$ -sided polygon is provided wherein, for a particular coordinate  $w_j$ , corresponding to the vertex  $\mathbf{q}_j$ , the method embodies a formula which depends only on the edge  $\mathbf{pq}_j$ , and the two adjacent angles  $\delta_j$  and  $\gamma_j$ . Similarly, a method is provided for deriving weights  $w_{ij}$  for expressing a vertex  $\mathbf{q}_i$  in a mesh representation of an object surface in terms of its one-ring neighbors  $\mathbf{q}_j$ ,  $\forall j \in N(i)$ . For a particular vertex  $\mathbf{q}_i$ , and neighbor vertex  $\mathbf{q}_j$ , this method embodies a formula which depends only on the edge  $\mathbf{q}_i\mathbf{q}_j$ , and the two adjacent angles  $\delta_j$  and  $\gamma_j$ . A method of parameterizing a mesh representation of an object surface using the latter formula is also provided. This method begins with the step of computing the weights  $w_{ij}$  in 3D space (in contrast to parameter space) for each of the vertices in the mesh representation. For a vertex  $i$ ,  $i \in [1 \dots n]$ , the weights  $w_{ij}$  allow the vertex  $i$  to be expressed in terms of its one-ring neighbors  $j \in N(i)$ . The method then proceeds to parameterizing the mesh representation responsive to the weights  $w_{ij}$ .